THE ASTROPHYSICAL JOURNAL

CONTENTS OF VOLUME 411, PART 1

1993 JULY 1, Number 1

	Page	Fiche
COSMIC MICROWAVE BACKGROUND FLUCTUATIONS AS OBSERVED BY *COBE*: THEORETICAL AND EXPERIMENTAL UNCERTAINTIES *Roberto Scaramella & Nicola Vittorio*	1	127-B1
A GENERALIZED ZEL'DOVICH APPROXIMATION TO GRAVITATIONAL INSTABILITY *M. Giavalisco, B. Mancinelli, P. J. Mancinelli, & A. Yahil*	9	127-B12
THE GALAXY VELOCITY FIELD AND COLD DARK MATTER MODELS *Giuseppe Tormen, Lauro Moscardini, Francesco Lucchin, & Sabino Matarrese*	16	127-C8
SOURCES OF SCATTER IN THE FUNDAMENTAL PLANE AND THE D_n-σ RELATION *Inger Jørgensen, Marijn Franx, & Per Kjærgaard*	34	127-E1
QUASARS AND ACTIVE GALACTIC NUCLEI IN RICH ENVIRONMENTS. III. THE RAPID EVOLUTION OF ACTIVE GALACTIC NUCLEUS ACTIVITY IN RICH CLUSTERS *H. K. C. Yee & E. Elingson*	43	127-E13
BL LACERTAE OBJECTS, FANAROFF-RILEY TYPE I RADIO SOURCES, AND CLUSTER COOLING FLOWS *Craig L. Sarazin & Michael W. Wise*	55	127-F13
INFRARED SPECTROSCOPY OF 11 RADIO GALAXIES AT $2 < z < 4$: EVIDENCE THAT SOME HIGH-REDSHIFT RADIO GALAXIES MAY BE PROTOGALAXIES *Stephen A. Eales & Steve Rawlings*	67	127-G13
HELICAL JETS AND THE MISALIGNMENT DISTRIBUTION FOR CORE-DOMINATED RADIO SOURCES *J. E. Conway & D. W. Murphy*	89	128-B10
STATISTICAL EVIDENCE FOR ACCRETION DISKS IN ACTIVE GALACTIC NUCLEI *David Caditz*	103	128-C13
HYDRODYNAMIC MODELS OF THE CARTWHEEL RING GALAXY *Curtis Struck-Marcell & James L. Higdon*	108	128-D7
THE TIME VARIABILITY OF THE ULTRAVIOLET CONTINUUM AND LYMAN-ALPHA IN 3C 273 *M.-H. Ulrich, T. J.-L. Courvoisier, & W. Wamsteker*	125	128-E13
TIME VARIABILITY IN THE GAMMA-RAY EMISSION OF 3C 279 *D. A. Kniffen, D. L. Bertsch, C. E. Fichtel, R. C. Hartman, S. D. Hunter, G. Kanbach, P. W. Kwok, Y. C. Lin, J. R. Mattox, H. A. Mayer-Hasselwander, P. F. Michelson, C. von Montigny, P. L. Nolan, K. Pinkau, E. Schneid, P. Sreekumar, & D. J. Thompson*	133	128-F10
ABUNDANCES OF H II REGIONS IN EARLY-TYPE SPIRAL GALAXIES *M. S. Oey & R. C. Kennicutt, Jr.*	137	128-G3
DYNAMICALLY HOT GALAXIES. II. GLOBAL STELLAR POPULATIONS *Ralf Bender, David Burstein, & S. M. Faber*	153	129-A8
THE H TO H_2 TRANSITION IN GALAXIES: TOTALLY MOLECULAR GALAXIES *B. G. Elmegreen*	170	129-C3
THE PROTO-GALAXY, GLOBULAR CLUSTERS, AND QUASARS *Sidney van den Bergh*	178	129-C13
IRAS VARIABLES AS GALACTIC STRUCTURE TRACERS: CLASSIFICATION OF THE BRIGHT VARIABLES *L. E. Allen, S. G. Kleinmann, & M. D. Weinberg*	188	129-D11
SUB-GIANT BRANCH EVOLUTION AND EFFICIENT CENTRAL ENERGY TRANSPORT *John Faulkner & Fritz J. Swenson*	200	129-F3

CONTENTS

	Page	Fiche
A DETERMINATION OF THE BASIC ATMOSPHERIC PARAMETERS OF ϕ CASSIOPEIAE *Patricia Rosenzweig & Lawrence Anderson*	207	129-F13
ON THE NATURE OF THE MOLECULAR CORES IN HIGH-LATITUDE CIRRUS CLOUDS. V. NH_3 AND ITS CHEMISTRY *B. E. Turner*	219	129-G13
EVIDENCE FOR PRECESSION OF THE R AQUARII JET *J. M. Hollis & A. G. Michalitsianos*	235	130-B3
THE ASSOCIATION OF ^{13}CO MOLECULAR GAS WITH *IRAS* SOURCES IN L1641 *H. Chen, Y. Fukui, & T. Iwata*	239	130-B11
HIGH-RESOLUTION H I OBSERVATIONS OF H II REGIONS. III. PHOTODISSOCIATION REGIONS AND THE MAGNETIC FIELD NEAR ORION B *Paul P. van der Werf, W. M. Goss, Carl Heiles, R. M. Crutcher, & T. H. Troland*	247	130-C8
DETECTION OF THE 2165 INVERSE CENTIMETER (4.619 MICRON) XCN BAND IN THE SPECTRUM OF L1551 IRS 5 *Stephen C. Tegler, David A. Weintraub, Louis J. Allamandola, Scott A. Sandford, Terrence W. Rettig, & Humberto Campins*	260	130-D9
2–12.5 MICRON IMAGING OF IRAS 21282+5050: THE STRUCTURE OF A YOUNG PLANETARY NEBULA *M. Meixner, C. J. Skinner, P. Temi, D. Rank, Jesse Bregman, J. R. Ball, E. Keto, J. F. Arens, & J. G. Jernigan*	266	130-E3
THE FORMATION OF PROTOSTELLAR DISKS. I. 1 $M_\odot$ *Harold W. Yorke, Peter Bodenheimer, & Gregory Laughlin*	274	130-E13
ENCOUNTERS BETWEEN BINARIES AND NEUTRON STARS *M. B. Davies, W. Benz, & J. G. Hills*	285	130-F13
RELIABILITY OF MAGNETIC INCLINATION ANGLE DETERMINATIONS FOR PULSARS *M. Coleman Miller & Russell J. Hamilton*	298	131-A1
HARD APEX TRANSITION IN QUASI-PERIODIC OSCILLATORS: CLOSING OF THE ACCRETION GAP *Garrett T. Biehle & Roger D. Blandford*	302	131-A8
SPECTRA OF LOW-MASS HELIUM STAR MODELS AND THE TYPE Ic SUPERNOVA SN 1987M *Douglas A. Swartz, Alexei V. Filippenko, Ken'ichi Nomoto, & J. Craig Wheeler*	313	131-B8
IRC +10420: A COOL HYPERGIANT NEAR THE TOP OF THE H-R DIAGRAM *Terry Jay Jones, Roberta M. Humphreys, Robert D. Gehrz, Geoffrey F. Lawrence, Franz-Josef Zickgraf, Harvey Moseley, Sean Casey, William J. Glaccum, Carol J. Koch, Robert Pina, Barbara Jones, Kim Venn, Otmar Stahl, & Sumner G. Starrfield*	323	131-C6
He 3-519: A PECULIAR POST-LBV, PRE-WN STAR? *Kris Davidson, Roberta M. Humphreys, Arsen Hajian, & Yervant Terzian*	336	131-D9
MAGNETOHYDRODYNAMIC FLOWS IN Be STARS: VARIABLE ENERGY FLUX AND HEAT INPUT DISTRIBUTION *María Elena Iglesias & Adela E. Ringuelet*	342	131-E3
ON THE NATURE OF THE POLARIZATION OPPOSITION EFFECT EXHIBITED BY SATURN'S RINGS *Michael I. Mishchenko*	351	131-F1
THE MORPHOLOGY OF FLARE PHENOMENA, MAGNETIC FIELDS, AND ELECTRIC CURRENTS IN ACTIVE REGIONS. I. INTRODUCTION AND METHODS *Richard C. Canfield, J.-F. de La Beaujardière, Yuhong Fan, K. D. Leka, A. N. McClymont, Thomas R. Metcalf, Donald L. Mickey, Jean-Pierre Wülser, & Bruce W. Lites*	362	131-G1
THE MORPHOLOGY OF FLARE PHENOMENA, MAGNETIC FIELDS, AND ELECTRIC CURRENTS IN ACTIVE REGIONS. II. NOAA ACTIVE REGION 5747 (1989 OCTOBER) *K. D. Leka, Richard C. Canfield, A. N. McClymont, J.-F. de La Beaujardière, Yuhong Fan, & F. Tang*	370	131-G12
THE MORPHOLOGY OF FLARE PHENOMENA, MAGNETIC FIELDS, AND ELECTRIC CURRENTS IN ACTIVE REGIONS. III. NOAA ACTIVE REGION 6233 (1990 AUGUST) *J.-F. de La Beaujardière, Richard C. Canfield, & K. D. Leka*	378	132-A10
THE DYNAMICS OF MAGNETIC FLUX RINGS *E. E. DeLuca, G. H. Fisher, & B. M. Patten*	383	132-B4
USING SOLAR *p*-MODES TO DETERMINE THE CONVECTION ZONE DEPTH AND CONSTRAIN DIFFUSION-PRODUCED COMPOSITION GRADIENTS *Joyce A. Guzik & Arthur N. Cox*	394	132-C4
ANOMALOUS DIFFUSION OF MAGNETIC ELEMENTS ACROSS THE SOLAR SURFACE *J. K. Lawrence & C. J. Schrijver*	402	132-D1
OBSERVATIONAL EVIDENCE FOR HOTTER TRANSITION REGION LOOPS WITHIN THE SUPERGRANULAR NETWORK *James F. Dowdy, Jr.*	406	132-D8

CONTENTS

	Page	Fiche
SIMULTANEOUS OBSERVATIONS OF SOLAR PLAGE WITH THE SOLAR EXTREME ULTRAVIOLET ROCKET TELESCOPE AND SPECTROGRAPH (SERTS), THE VLA, AND THE KITT PEAK MAGNETOGRAPH *Jeffrey W. Brosius, Joseph M. Davila, William T. Thompson, Roger J. Thomas, Gordon D. Holman, N. Gopalswamy, Stephen M. White, Mukul R. Kundu, & Harrison P. Jones*	410	132-E4
IONIZATION STATES OF LOW-ENERGY COSMIC RAYS: RESULTS FROM SPACELAB 3 COSMIC-RAY EXPERIMENT *A. Dutta, J. N. Goswami, S. Biswas, N. Durgaprasad, B. Mitra, & R. K. Singh*	418	132-F1
MEASUREMENT OF THE TRANSITION PROBABILITY OF THE C III 190.9 NANOMETER INTERSYSTEM LINE *Victor H. S. Kwong, Z. Fang, T. T. Gibbons, W. H. Parkinson, & Peter L. Smith*	431	132-G7
INSTRUCTIONS TO AUTHORS	i	133-A1

1993 JULY 10, Number 2

CLUMPY COLD DARK MATTER *Joseph Silk & Albert Stebbins*	439	135-B1
THE CLUSTER-CLUSTER CORRELATION IN HYBRID MODELS *Y. P. Jing, H. J. Mo, G. Börner, & L. Z. Fang*	450	135-C1
PECULIAR VELOCITIES OF RICH CLUSTERS IN HOT AND COLD DARK MATTER MODELS *George Rhee*	455	135-C8
STATISTICALLY EFFICIENT TESTING OF THE HUBBLE AND LUNDMARK LAWS ON *IRAS* GALAXY SAMPLES *I. E. Segal, J. F. Nicoll, P. Wu, & Z. Zhou*	465	135-D6
THE TWO-POINT CORRELATION FUNCTION IN PANCAKE MODELS AND THE FAIR SAMPLE HYPOTHESIS *Thomas Buchert & Vicent J. Martínez*	485	135-F1
A DEEP *I*-BAND SELECTED GALAXY SAMPLE: IMPLICATIONS FOR GALAXY EVOLUTION *Simon J. Lilly*	501	135-G6
VELOCITY DISPERSIONS IN STATISTICAL LENSING *Xiang-Ping Wu*	513	136-A7
TURBULENT GENERATION OF INTRACLUSTER MAGNETIC FIELDS AND FARADAY ROTATION MEASUREMENTS *Oleg Goldshmidt & Yoel Rephaeli*	518	136-B1
MEASUREMENTS OF COSMIC BACKGROUND RADIATION ANISOTROPY AT INTERMEDIATE ANGULAR SCALE *Lucio Piccirillo & Paolo Calisse*	529	136-C1
DATA ANALYSIS OF THE COSMIC BACKGROUND RADIATION ANISOTROPY EXPERIMENTS *Juan Betancort-Rijo*	534	136-C8
A GENERAL RELATIVISTIC HYDROSTATIC MODEL FOR A GALAXY *Roberto Hojman, Leda Peña, & Nelson Zamorano*	541	136-D3
SUBPARSEC-SCALE RADIO STRUCTURE IN NGC 1275: COMPLEX STRUCTURE IN THE VICINITY OF THE CENTRAL ENGINE *T. Venturi, A. C. S. Readhead, J. M. Marr, & D. C. Backer*	552	136-E2
[Fe II] 1.64 MICRON EMISSION IN HIGH-LUMINOSITY AND ULTRALUMINOUS *IRAS* GALAXIES *Luis Colina*	565	136-F3
NUCLEAR WINDS AND THE NARROW-LINE EMISSION FROM ACTIVE GALAXIES *Steven J. Smith*	570	136-F10
NUCLEAR WINDS IN ACTIVE ELLIPTICAL GALAXIES. I. INTERACTION *Steven J. Smith, C. F. Kennel, & F. V. Coroniti*	581	136-G9
IONIZED ABSORBERS, IONIZED EMITTERS, AND THE X-RAY SPECTRUM OF ACTIVE GALACTIC NUCLEI *Hagai Netzer*	594	137-A10
SPIRAL SHOCKS IN ACCRETION DISKS AS A CONTRIBUTOR TO VARIABILITY IN ACTIVE GALACTIC NUCLEI *Sandip K. Chakrabarti & Paul J. Wiita*	602	137-B6

	Page	Fiche
BINARY BLACK HOLES IN STATIONARY ORBITS AND A TEST OF THE ACTIVE GALACTIC NUCLEUS PARADIGM *Sandip K. Chakrabarti*	610	137-C2
MULTIWAVELENGTH MONITORING OF THE BL LACERTAE OBJECT PKS 2155–304. I. THE *IUE* CAMPAIGN *C. M. Urry, L. Maraschi, R. Edelson, A. Koratkar, J. Krolik, G. Madejski, E. Pian, G. Pike, G. Reichert, A. Treves, W. Wamsteker, R. Bohlin, J. Bregman, W. Brinkmann, L. Chiappetti, T. Courvoisier, A. V. Filippenko, H. Fink, I. M. George, Y. Kondo, P. G. Martin, H. R. Miller, P. O'Brien, J. M. Shull, M. Sitko, A. E. Szymkowiak, G. Tagliaferri, S. Wagner, & R. Warwick*	614	137-C9
A MODEL FOR THE VERTICAL DISTRIBUTION OF STARS IN DISK GALAXIES *James B. Dove & Harley A. Thronson, Jr.*	632	137-E7
THE PHYSICAL PROPERTIES OF A SLOW NOVA IN THE BULGE OF M31 *Austin B. Tomaney & Allen W. Shafter*	640	137-F3
A SEARCH FOR YOUNG STARS IN THE HALO OF M31 *R. J. H. McCausland, E. S. Conlon, P. L. Dufton, A. Fitzsimmons, M. J. Irwin, & F. P. Keenan*	650	137-G1
SPATIALLY RESOLVED OPTICAL AND NEAR-INFRARED SPECTROSCOPY OF I Zw 18 *Evan D. Skillman & Robert C. Kennicutt, Jr.*	655	137-G8
HCO^+, $H^{13}CN$, AND $H^{12}CN$ APERTURE SYNTHESIS OBSERVATIONS OF THE CIRCUMNUCLEAR MOLECULAR RING IN THE GALACTIC CENTER *J. M. Marr, M. C. H. Wright, & D. C. Backer*	667	138-A8
PULSAR DISTANCES AND THE GALACTIC DISTRIBUTION OF FREE ELECTRONS *J. H. Taylor & J. M. Cordes*	674	138-B3
ON THE SOURCE FUNCTION OF THE SOFT X-RAY DIFFUSE BACKGROUND *David N. Burrows & Ralph P. Kraft*	685	138-C1
SPATIAL AND TEMPORAL DISTRIBUTED ACCELERATION OF COSMIC RAYS BY SUPERNOVA REMNANTS: THREE-DIMENSIONAL SIMULATIONS *G. A. Medina Tanco & R. Opher*	690	138-C8
MAGNETIC FIELDS IN MASSIVE CLOUD CORES: COMPARISON OF MILLIPOL AND *IRAS* RESULTS *Brian D. Kane, Dan P. Clemens, Richard Barvainis, & Robert W. Leach*	708	138-E1
HUNT FOR VARIATIONS IN MOLECULAR GAS AND CLOUD PROPERTIES ACROSS THE INNER, NORTHERN GALACTIC DISK *Harvey S. Liszt*	720	138-F1
HIGH-RESOLUTION Ca II OBSERVATIONS OF THE LOCAL INTERSTELLAR MEDIUM *J. V. Vallerga, P. W. Vedder, N. Craig, & B. Y. Welsh*	729	138-F13
THE INTERSTELLAR ABUNDANCES OF TIN AND FOUR OTHER HEAVY ELEMENTS *L. M. Hobbs, D. E. Welty, D. C. Morton, L. Spitzer, & D. G. York*	750	139-A13
THE RADIO STRUCTURE OF SUPERNOVA REMNANT 0540–693 *R. N. Manchester, L. Staveley-Smith, & M. J. Kesteven*	756	139-B8
NEW RADIO OBSERVATIONS OF SUPERNOVA REMNANT 1E 0102.2–7219 IN THE SMALL MAGELLANIC CLOUD *S. W. Amy & Lewis Ball*	761	139-C1
THE EXCITING YOUNG STELLAR OBJECT FOR THE MOLECULAR OUTFLOW AT THE CORE OF L1287 *David A. Weintraub & Joel Kastner*	767	139-C9
INTERFEROMETRIC OBSERVATIONS FOR OXYGEN-CONTAINING ORGANIC MOLECULES TOWARD ORION-KL *Y. C. Minh, M. Ohishi, D. G. Roh, M. Ishiguro, & W. M. Irvine*	773	139-D3
FAST, LOW-IONIZATION EMISSION REGIONS AND OTHER MICROSTRUCTURES IN PLANETARY NEBULAE *Bruce Balick, M. Rugers, Yervant Terzian, & Jayaram N. Chengalur*	778	139-D10
3.3 AND 11.3 MICRON IMAGES OF HD 44179: EVIDENCE FOR AN OPTICALLY THICK POLYCYCLIC AROMATIC HYDROCARBON DISK *Jesse D. Bregman, David Rank, Pasquale Temi, Doug Hudgins, & Laura Kay*	794	139-F1
A SELF-CONSISTENT MODEL FOR THE LONG-TERM GAMMA-RAY SPECTRAL VARIABILITY OF CYGNUS X-1 *Fulvio Melia & Ranjeev Misra*	797	139-F8
ON THE MASS OF THE COMPACT OBJECT IN THE BLACK HOLE BINARY A0620–00 *Carole A. Haswell, Edward L. Robinson, Keith Horne, Rae F. Stiening, & Timothy M. C. Abbott*	802	139-G1
CONVECTION AND NEUTRINO EMISSION IN THE LATE STAGES OF MASSIVE STAR EVOLUTION *Maurice B. Aufderheide*	813	140-A1

CONTENTS

	Page	Fiche
THE EVOLUTION OF MASSIVE STARS INCLUDING MASS LOSS: PRESUPERNOVA MODELS AND EXPLOSION *S. E. Woosley, Norbert Langer, & Thomas A. Weaver*	823	140-A14
BIFURCATION ANALYSIS OF A SIMPLE ANALYTIC MODEL OF SELF-PROPAGATING STAR FORMATION *Thomas Neukirch & Michael Hesse*	840	140-C5
INTERACTING MASSIVE BINARIES, H-R DIAGRAM OF THE LARGE MAGELLANIC CLOUD, AND SN 1987A *N. Rathnasree*	848	140-D1
GODDARD HIGH-RESOLUTION SPECTROGRAPH OBSERVATIONS OF NARROW DISCRETE STELLAR WIND ABSORPTION FEATURES IN THE ULTRAVIOLET SPECTRUM OF THE O7.5 III STAR ξ PERSEI *Steven N. Shore, Bruce Altner, C. T. Bolton, Jason A. Cardelli, & Dennis C. Ebbets*	864	140-E5
BROAD-BAND X-RAY TELESCOPE OBSERVATIONS OF THE MAGNETIC CATACLYSMIC VARIABLE H0538+608 = BY CAMELOPARDALIS *T. R. Kallman, E. M. Schlegel, P. J. Serlemitsos, R. Petre, F. Marshall, K. Jahoda, E. A. Boldt, S. S. Holt, R. F. Mushotzky, J. Swank, A. E. Szymkowiak, R. L. Kelley, A. Smale, K. Arnaud, K. Weaver, & F. B. Paerels*	869	140-E12
RIGOROUS TREATMENT OF THE RADIATIVE TRANSFER PROBLEM IN STELLAR WINDS: SIGNIFICANCE OF THE VELOCITY LAW AND THE CHROMOSPHERE IN THE Hα PROFILE *Lydia S. Cidale & Adela E. Ringuelet*	874	140-F5
RADIATIVE ACCELERATIONS ON IRON USING OPACITY PROJECT DATA *G. Alecian, G. Michaud, & J. Tully*	882	140-G1
ON THE CONVECTIVE INSTABILITY OF THE COMETARY IONOSPHERE *A. I. Ershkovich & P. L. Israelevich*	891	140-G12
IS IT JUSTIFIED TO ASSUME THAT "EVERYWHERE IN THE SUN'S PHOTOSPHERE-CORONA DOMAIN THE ELECTRIC CONDUCTIVITY IS HIGH"?; OR, WHAT DRIVES THE SOLAR UPPER ATMOSPHERE? *Uri Feldman*	896	141-A5
VISIBILITY OF SUNSPOTS *Bradley E. Schaefer*	909	141-B8